GSM Based LED Display Board

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Abstract— *'GSM based LED Moving Display Board' is a system in which there is a moving sign board that helps in updating of new messages easily. The advantage of using LED in place of LCD is the better visibility of LED even from distance. LED display boards can be used for displaying digital information at many places like railway stations, shopping centre and educational institutions to many people at a time. But there is a complication in updating the message because the message can be entered using a computer and for this purpose the person needs to be at the venue of the display board. This problem can be solved by using GSM technology. With the introduction of GSM based sytem the message to be displayed can be send to a mobile through SMS. Now the person needs not to be at the place where information has to be delivered.*

Keywords— GSM, LED, Microcontroller, Scrolling Display, SMS

I. INTRODUCTION

In the last couple of decades, communication technology has developed by leaps and bounds. The use of "embedded system in communication" has given rise to many interesting applications. One of such applications is public addressing system (PAS). Many companies are manufacturing audio / video systems like public announcement system, CCTV, programmable sign boards etc. But all these systems are generally hardwired, complex in nature and difficult to expand. So, by adding wireless communication interface such As GSM to these systems, we can overcome their limitations . Now-a-days LED Message Scrolling Displays are becoming very popular .These displays are used in shopping malls, theaters, public transportation, traffic signs, highways signs, etc. Now a days every advertisement is going to be digital. The big shops and shopping centers are using the digital moving displays now. In Railway station and bus stands everything that is ticket information, platform number etc is displaying in digital moving display. But in these displays if they want to change the message or style they have to go there and connect the display to PC or LAPTOP. Suppose the same message if the person want to display in main centers of the cities ,means he has to go there with laptop and change the message by connecting into PC .This system is also useful mainly for police or army .i.e. displays will be connected to all the main centers in city if they want to display messages about something crucial within 5 minute, which they cannot. So keeping this in mind a new display system which can be accessed remotely, using the GSM technology to make the communication between microcontroller and mobile was designed.

II. LITERATURE REVIEW

With the development of cellular networks in the 1970's for increasing the lack of frequencies in the radiotelephone services which in turn lead to introduction of AMPS (Advanced Mobile Phone System) where the transmission was analog based. This was known to be the first generation in cellular networks. The second generation was based on digital transmission and was called with various abbreviations as GSM (Global System for Mobile communications), ERMES (European Radio Messaging System). Various Cordless telephone standards were also introduced during this time only.The third generation has risen with the unification of different technologies; some of them which are popularly known are FPLMTS (Future Public Land Mobile Telecommunications System), UMTS (Universal Mobile Telecommunication System), and IMT-2000(Internationa Mobile telecommunication)

III. DESIGN

The led display system mainly consists of a GSM receiver and a display toolkit which can be programmed from an authorized mobile phone. It receives the SMS, validates the sending Mobile Identification Number (MIN) and displays the desired as an electronic notice board and display the important notices instantaneously thus avoiding the latency. Being wireless, the GSM based led display is easy to expand and allows the user to add more display units at anytime and at any location in the campus depending on the requirement of the institute. A text message is typed in the GSM mobile phone and sent it by using SMS service of the mobile phone to LED moving display boards. A GSM modem is connected to the LED display hardware is used to receive the SMS and send it to the controller circuit of the LED display. Then the controller circuit of the LED display filters the message content in SMS and changes the display text in LED

display dynamically. By using this SMS service it is possible to change the text in the LED display board from anywhere in the country. The idea described in this paper reduces the total cost that is required in the traditional LED display boards not only it makes easier to send message to the LED display boards. The system uses a GSM modem at the display side to receive SMS. An IC AT89c51 belongs to microcontroller act as controller to drive the LED display board. Along with these a power supply unit and supporting hardware for microcontroller is used.[3]

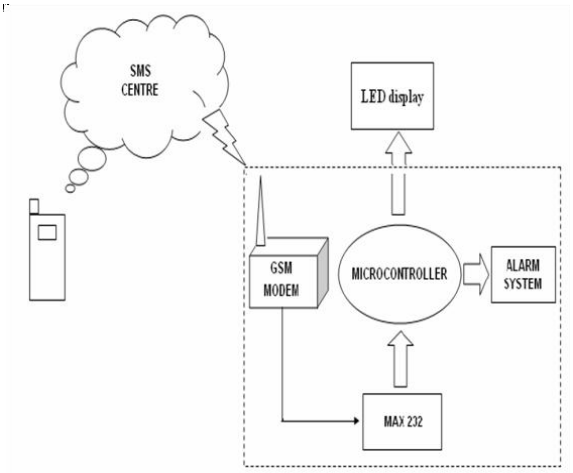

Fig.1 : Design overview of GSM mobile phone based LED scrolling message display system.

IV. HARDWARE COMPONENTS

4.1 Power supply

4.1.1 Transformer

Transformers convert AC electricity from one voltage to another with a little loss of power. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high voltage to a safer low voltage**.** The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. A step-down transformer has a large number of turns on its primary coil which is connected to the high voltage mains supply, and a small number of turns on its secondary coil to give a low output voltage.

Fig.2 : A typical transformer

4.1.2 Voltage regulator 7805

Following are the features of it:

-Output Current up to 1A.

-Output Voltages of 5.

-Thermal Overload Protection.

- Short Circuit Protection.

-Output Transistor Safe Operating Area Protection.

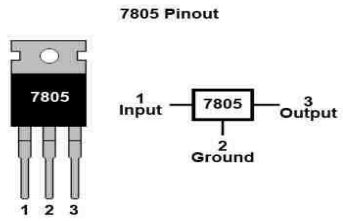

Fig.3: Voltage regulator

4.1.3 Bridge rectifier

A rectifier is an electrical device that converts AC, which periodically reverses direction to DC current that flows in only one direction, a process known as rectification.

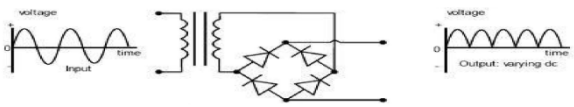

Fig.4: Bridge rectifier circuit

4.2 LPC 2148 MICROCONTROLLERS

The LPC2141/2/4/6/8 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty

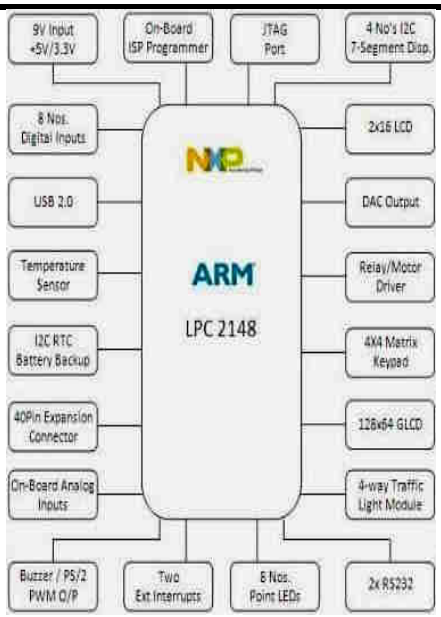

Fig.5: LPC2148 MICROCONTROLLER

4.3 GSM

The Global System for Mobile communication, usually called GSM, (ETSI) to describe protocols for 2G digital cellular networks used by mobile phones. [6],[7].GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity

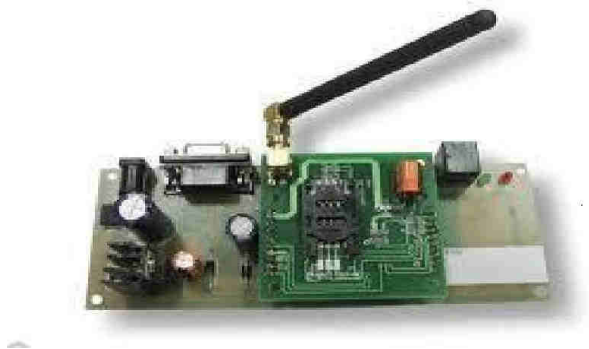

Fig. 6: GSM Kit

4.4 MAX 232g

The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC. The controller operates at TTL logic level (0-5V) whereas the serial communication in PC works on RS232 standards (-25 V to + 25V). This makes it difficult to establish a direct link between them to communicate with each other.

It is a dual driver/receiver that includes a capacitive voltage generator to supply RS232 voltage levels from a single 5V supply. Each receiver converts RS232 inputs to 5V TTL/CMOS levels. These receivers (R1 & R2) can accept ±30V inputs.

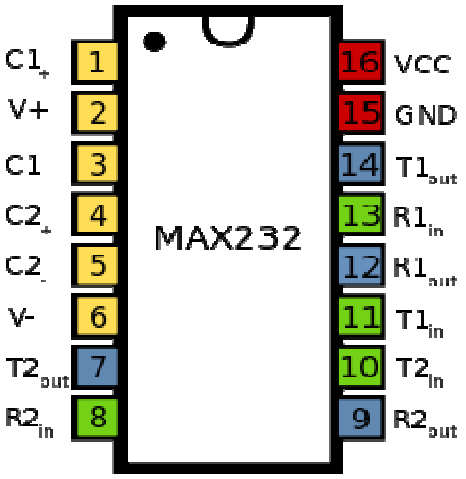

Fig.7 : Pin diagram of MAX 232

4.5 LED

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a pn-junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor An LED is often small in area (less than 1 mm^2) and integrated optical components may be used to shape its radiation pattern.[4]

The LED consists of a chip of semiconducting material doped with impurities to create a p-n junction. As in other diodes, current flows easily from the p-side, or anode, to the n-side, or cathode, but not in the reverse direction. Charge-carriers electrons and holes flow into the junction from electrodes with different voltages. When an electron meets a hole, it falls into a lower energy level and releases energy in the form of a photon. An LED will begin to emit light when more than 2 or 3 volts is applied to it. Some external system must control the current through the LED to prevent damage.

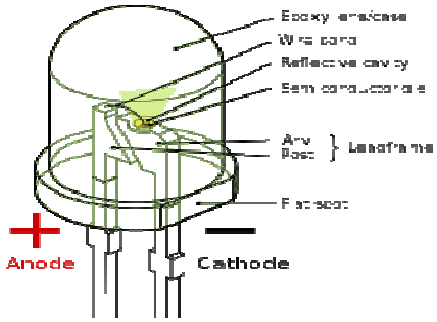

Fig.8 : LED diagram

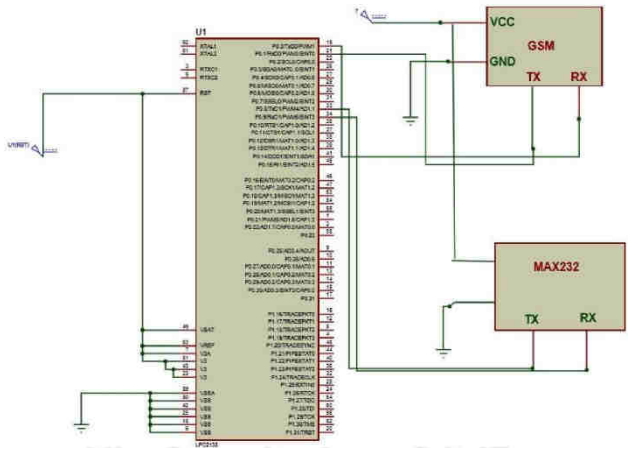

Fig.9 : Schematic diagram of led board

V. SOFTWARE

-Express PCB-Express PCB is free PCB software and is a snap to learn and use. Designing circuit boards is simple for the beginner and efficient for the professional. The board manufacturing service makes top quality two and four layer PCBs.

Embedded C-Embedded C is used for microcontroller programming. There is a large and growing international demand for programmers with 'embedded' skills, and many desktop developers are starting to move into this important area. Because most embedded projects have severe cost constraints, they tend to use low-cost processors like the 8051 family of devices considered in this paper.

Keil-Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. The Keil 8051 Development Tools are designed to solve the complex problems facing embedded software developers.

Visual Basic-Visual Basic (VB) is an event driven programming language and associated development environment from Microsoft for its COM programming model. Visual Basic was derived from BASIC and enables the rapid application development (RAD) of graphical user interface (GUI) applications. Visual Basic allows many additional components to be added to the toolbox. The Microsoft component is used to add a serial communication facility. Here we have used VB also for providing graphical user interface at PC for easy access to display system, password changing and monitoring.

VI. CONCLUSION

Advantages:

-Using GSM technology message can be send to any distant locations, from any part of the World.

- Flexible advertising times

-Unauthorized access of notice board (password) is not possible.

-No printing and photocopying costs. Thus saves time, Energy and finally environment.

Limitations:

-When there is network problem GSM doesn't work.

-LEDs are currently expensive

-LEDs can shift colour due to age and temperature

Applications:

-As Display board at educational institutions.

-To display traffic information

-to electronically display real time clock

-At banks, ATM, hospitals

VII. RESULT

We can use this Project in college notice board, a professor can send message for the immediate gathering of students at department. It can be used on Highways for traffic control, like traffic on one side of the road may be blocked in view of VVIP movement or jam ahead.

REFERENCES

[1] Gao, W, Zhang, G. and Jiang ,X. "Study Implementation of Agricultural SMS Management System". In Proceedings of IEEE International Conference on Information Technology and Computer Science, 13-17 October 2009, Beijing, China, pp. 1-4, 2009.

[2] Shereen , N. Z. and Rozumah , B. "Mobile Phone use Amongst Student in University in Malaysia: It correlates and relationship to Psychological Health". European Journal of Scientific Research. Vol. 37. No.2. pp. 206 – 218,2009

[3] Bollen, L., Eimler,S. and Hoppe, H.U. "SMS-based Discussions – Technology Enhanced Collaboration for a Literature Course". In Proceedings of the 2nd IEEE International Workshop on Wireless and Mobile Technologies in Education, 24- 27 May 2004, Germany, pp. 1-2, 2004.

[4] Deng chunjjan, Liu Wei, Zou Kun, Yang Liang "A Solution Of LED Large Screen Display Based On Wireless Communication",10.1109/apwcs.2010.24

[5] http://www.daimlerchrysler.com/dccomDatasheet of NE555.

[6] Books: GSM and Personal Communicati – ons Handbook- SiegmundRedl - MatthiasWeber- MalcolmW. Oliphant

[7] Books: Principles and Applications of GSM- Vijay Garg